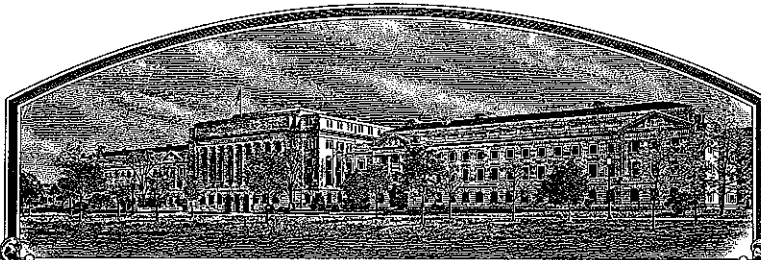


No.

200300283



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Michigan State University

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMERICAL GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

BEAN, FIELD

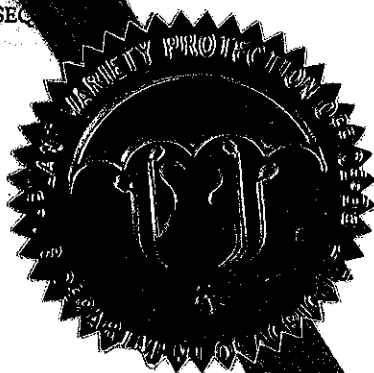
'Seahawk'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this fifth day of July, in the year two thousand and six.

Attest:

[Signature]
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

[Signature]
Secretary of Agriculture



U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICEAPPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2428).

1. NAME OF OWNER Michigan State University		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME N97774		3. VARIETY NAME SEAHAWK	
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) 246 Administration Building East Lansing, MI 48824-1046		5. TELEPHONE (include area code)		FOR OFFICIAL USE ONLY	
		6. FAX (include area code)		PVPO NUMBER 200300283	
7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) Land Grant University		8. IF INCORPORATED, GIVE STATE OF INCORPORATION N/A		FILING DATE July 15, 2003	
9. DATE OF INCORPORATION N/A		10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. (First person listed will receive all papers) Dr. Michael Lang, Esquire or Ms. Loraine J. Hudson Office of Intellectual Property Michigan State University 246 Administration Building East Lansing, MI 48824-1046		FILING AND EXAMINATION FEES: \$ 3220.00 + 432.00 DATE 7/15/2003 CERTIFICATION FEE: \$ 768.00 DATE 3/29/06	
11. TELEPHONE (include area code) 517-355-2186		12. FAX (include area code) 517-432-3880		13. E-MAIL oip@msu.edu	
14. CROP KIND (Common Name) NAVY BEAN		15. GENUS AND SPECIES NAME OF CROP Phaseolus vulgaris L.		16. FAMILY NAME (Botanical) Fabaceae	
17. IS THE VARIETY A FIRST GENERATION HYBRID? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse) a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety d. <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$3,652), made payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office)		19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? See Section 83(a) of the Plant Variety Protection Act <input checked="" type="checkbox"/> YES (If "yes", answer items 20 and 21 below) <input type="checkbox"/> NO (If "no", go to item 22)	
20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? IF YES, WHICH CLASSES? <input checked="" type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED		21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS. <input checked="" type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED 1 generation (If additional explanation is necessary, please use the space indicated on the reverse.)		22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U.S. OR OTHER COUNTRIES? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. (Please use space indicated on reverse.)	
23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)? <input checked="" type="checkbox"/> YES PVP9500063 <input type="checkbox"/> NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.)		24. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate. The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42. Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.		SIGNATURE OF OWNER Loraine J. Hudson NAME (Please print or type) Loraine J. Hudson	
CAPACITY OR TITLE Director		DATE 6/25/03		SIGNATURE OF OWNER Michael J. Lang NAME (Please print or type) Michael J. Lang	
CAPACITY OR TITLE Licensing Associate		DATE 6/25/03			

GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to **reproduce** the variety, or for tuber reproduced varieties verification that a viable (*in the sense that it will reproduce an entire plant*) tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for \$3,652 (\$432 filing fee and \$3,220 examination fee), payable to "Treasurer of the United States" (See Section 97.6 of the Regulations and Rules of Practice.) Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfilled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of \$432 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office

Telephone: (301) 504-5518

FAX: (301) 504-5291

Homepage: <http://www.ams.usda.gov/science/pvpo/pvp.htm>

ITEM

- 18a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified
- 18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.
- 18c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.
- 18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 18e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.
19. If "Yes" is specified (*seed of this variety be sold by variety name only, as a class of certified seed*), the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. (See *Regulations and Rules of Practice, Section 97.103*).
22. See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.
23. See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.

21. CONTINUED FROM FRONT (Please provide a statement as to the limitation and sequence of generations that may be certified.)

22. CONTINUED FROM FRONT (Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)

23. CONTINUED FROM FRONT (Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center--East, Beltsville, MD 20705.

Telephone: (301) 504-8089. <http://www.ams.usda.gov/lsg/seed.htm>

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 3.0 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, sexual orientation, marital or family status, political beliefs, parental status, or protected genetic information. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

ST-470 (02-10-2003) designed by the Plant Variety Protection Office with Word 2000. Replaces former versions of ST-470, which are obsolete.

2

INSTRUCTIONS

200308283

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Plant Variety Protection Office

Telephone: (301) 504-5518

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ITEM

- 18a. Give:
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 - (2) the details of subsequent stages of selection and multiplication;
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22. See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.
23. See Section 5.5 of the Act for instructions on claiming the benefit of an earlier filing date.

22. CONTINUED FROM FRONT (Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)

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USA-PVP 9500063 - 9/13/1999

Huron Navy Bean used as parent

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)

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Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Agriculture, Clearance Officer, OIRM, AG Box 7630, Jamie L. Whitten Building, Washington, D.C. 20250. When replying, refer to OMB No. 0581-0055 and form number in your letter. Under the PRA of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

The U.S. Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, and marital or familial status. (Not all prohibited bases apply to all programs). Persons with disabilities who require alternative means for communication of program information (braille, large print, audiotape, etc.) should contact the USDA Office of Communications at (202) 720-2791. To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D.C. 20250, or call (202) 720-7327 (voice) or (202) 720-1127 (TDD). USDA is an equal opportunity employer.

S&T-470 (6-98) designed by the Plant Variety Protection Office with WordPerfect 6.0a. Replaces STD-470 (03-96) which is obsolete.

SEAHAWK NAVY BEAN**EXHIBIT A - ORIGIN AND BREEDING HISTORY:**

- Winter 1994* Original cross 94N108 was made in E. Lansing, MI. Parentage: Bunsu/Huron. Bunsu is a white mold tolerant, mid-season, floppy indeterminate commercial navy bean variety; Huron is a white mold tolerant, early-season, short erect indeterminate commercial navy bean variety. The cross was made to combine diverse sources of white mold resistance. F₁ plants were grown and selfed in the greenhouse in E. Lansing, MI during spring 95 and no selection was practiced in this generation.
- Summer 1995* Single plant selection no. 10 was made in F₂ nursery at Saginaw MI on the basis of agronomic and navy bean seed traits. Traits selected included upright type II growth habit, short vine development, lodging resistance, mid-season maturity and uniform dry down as the Bunsu parent exhibits an undesirable persistent green stem trait at harvest. Seed color and size traits were selected as acceptable commercial navy seed class.
- Winter 1995* A single F₃ progeny row was grown and mass selected for seed and agronomic traits at Isabela, Puerto Rico. Traits selected included upright short vine, lodging resistance, good pod load, navy bean seed size and color, and freedom from diseases. Remnant seed was screened for resistance to the NL-3 strain of BCMV in the greenhouse and only seed of resistant individuals was returned from PR.
- Summer 1996* Single plant selection no. 6 was made in the F₄ nursery at Saginaw, MI for resistance to rust, upright architecture, lodging resistance, acceptable pod load and placement, mid-season maturity, and navy bean seed traits. All future selections are F₄-derived as the line was mass selected in later generations.
- Winter 1997* A single F₅ progeny row was grown and mass selected at Isabela, PR on the basis of agronomic and seed traits, similar to those described in the F₄ generation. Remnant seed was confirmed to be resistant to BCMV, strain NL 3 in the greenhouse in E. Lansing.
- Summer 1997* A F₆ breeding line coded 94N108-10-01-06 entered replicated yield trials at Saginaw, MI with the permanent code number N97774. Canning tests were initiated. The line was advanced based on superior yield performance, and excellent canning quality.
- Summer 98-02* Over five years of testing breeding line N97774 was advanced from F₇ to F₁₁ generation, yield tested at 30 locations in mid-Michigan, and at locations in ND, and WA. White mold screening was conducted each year in Montcalm, MI and canning tests were conducted on seed produced at the Michigan locations.
- Winter 1999* A source of breeder seed of N97774 was increased in the greenhouse in E.

Lansing, MI and sent to Washington to establish a western seed source in 2000.

Winter 2002

Based on continued superior yield, acceptable maturity, white mold tolerance and canning performance, **N97774** is being proposed for release under the variety name **SEAHAWK**. Western breeder seed is available for increase and distribution.

Uniformity: SEAHAWK navy bean is a self-pollinated pure line variety. Observations indicate that through five generations of self-pollination from the F_6 to the F_{10} generation, no offtypes or variants were observed during the course of repeated multiplication and selfing of SEAHAWK for six (6) generations of self-pollination.

Stability: SEAHAWK navy bean is a self-pollinated pure line variety that was released as a F_{11} generation pure line (selfed 11 generations) bean variety that is uniform and stable within commercially acceptable limits of commercial navy bean varieties. The breeding line that eventually was released as the cultivar Seahawk was selfed pollinated for eleven (11) generations before release as a variety and Seahawk exhibited stability and uniformity of plant and seed type expected of commercial navy bean varieties over six (6) generations of self-pollination.

SEAHAWK NAVY BEAN

EXHIBIT B - STATEMENT OF DISTINCTNESS

Seahawk most closely resembles Vista navy bean variety. Seahawk has a significantly larger seed size than Vista. Seed size is measured as the weight in grams (g) of 100 seeds adjusted to 18% moisture. Data on seed size (g/100 seeds) below was collected over six (6) years (1997-2001) from eight (8) replicated yield trials conducted at the Saginaw Valley Bean & Beet Farm in Saginaw Michigan, where the two navy bean varieties, Seahawk and Vista were grown for testing. Data shown is the average seed weight of 100 seeds from each replicate from each test.

Seahawk averaged 24.6 g/100 seeds over the eight (8) tests, whereas Vista averaged 21.2 g/100seeds. A paired T-Test conducted on the data confirmed that these values for seed size between Seahawk and Vista were significantly different.

	<u>SEAHAWK</u>	<u>VISTA</u>
<u>YEAR</u>	<u>SEED SIZE</u>	<u>SEED SIZE</u>
1997	25.6	21.7
1998	23.3	20.4
1999	26.9	23.6
2000	22.5	18.5
2000	23.4	20.3
2001	25.7	22.5
2002	25.7	21.6
<u>2002</u>	<u>23.7</u>	<u>21.1</u>
Mean	24.6	21.2
T Test (P=)	0.0000051454	

OBJECTIVE DESCRIPTION OF VARIETY
Dry Edible Bean (*Phaseolus vulgaris* L.)

NAME OF APPLICANT(S) Michigan State University	EXPERIMENTAL NAME N97774	VARIETY NAME SEAHAWK
ADDRESS (Street and No. or R.F.D. No., City, State, ZIP) 109 Agriculture Hall Michigan State University East Lansing, MI 48824		FOR OFFICIAL USE ONLY PVPO NO. 200300283

Provide data for all characters unless indicated as "optional." Place numbers in the boxes for the characters or numerical values which best describe this variety. Measured data should be the mean of an appropriate number of well spaced (15-20 cm) plants. The Royal Horticultural Society or any recognized color standard may be used to determine plant color. Designate the color system used below.

COLOR SYSTEM USED	LOCATION OF THE TEST(S) TO EVALUATE THIS VARIETY
-------------------	--

1. MARKET CLASS

0	1
---	---

CLASS	CHECK
1 = Navy (Pea)	Seafarer
2 = Small White	Aurora
3 = Black	Midnight
4 = Pinto	UI-114
5 = Great Northern	UI-59
6 = Small Red	NW-59
7 = Pink	Viva
8 = Cranberry	UI-50
9 = Dark Red Kidney	Montcalm
10 = Light Red Kidney	Redcloud
11 = Yellow Eye	Steuben
12 = Other (specify)	
Check = Vista	

2. MATURITY

2

1 = Early (80-90 days); 2 = Medium (90-100 days); 3 = Late (>100 days)

	9	7
--	---	---

Days from planting to harvest maturity

--	--	--	--

Heat units from planting to harvest maturity (optional). Specify base temperature used: _____

1	0	0
---	---	---

Days from planting to harvest maturity of check variety (use check appropriate to market class shown in item 1)

3. PLANT HABIT

4

TYPE

- 1 = Ia Bush-determinate, strong and erect stem and branches
- 2 = Ib Bush-determinate, weak stem and branches
- 3 = IIa Erect growth habit-indeterminate, guides (runners) short or not developed
- 4 = IIb Erect growth habit-indeterminate, guides medium to long, with no ability to climb
- 5 = IIIa Vine-indeterminate, short guides with no ability to climb
- 6 = IIIb Vine-indeterminate, long guides with ability to climb
- 7 = IVa Indeterminate climbing, pods distributed throughout the plant
- 8 = IVb Indeterminate climbing, pods concentrated on the upper part of the plant

	4	6
--	---	---

Average height of mature plant, in cm.

	4	9
--	---	---

Average height of check variety, in cm. (use same check as above)

2

Pod Position: 1 = Low (lower pods touching soil surface)
2 = High (lower pods not touching soil surface)
3 = Scattered (not concentrated high or low)

1

Adaptability to machine harvest: 1 = Adapted 2 = Not Adapted

2

Lodging resistance: 1 = Good 2 = Fair 3 = Poor

4. LEAFLET MORPHOLOGY (Use terminal leaflet of a fully expanded trifoliolate)

1

1 = Smooth; 2 = Wrinkled

1

1 = Dull; 2 = Glossy; 3 = Semiglossy; 4 = Variable

1

SHAPE:

1 = Ovate



2 = Lanceolate



3 = Deltoid



4 = Cordate



5 = Rhomboid



2

APEX OF LEAFLET:

1 = Acute



2 = Acuminate



3 = Cuspidate



4 = Obtuse



1

BASE OF LEAFLET:

1 = Obtuse



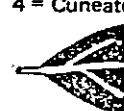
2 = Oblique



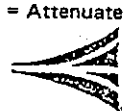
3 = Cordate



4 = Cuneate



5 = Attenuate



5. FLOWER COLOR AND DAYS TO BLOOM

☐ 1 COLOR OF STANDARD: 1 = White; 2 = Cream; 3 = Pink; 4 = Blue; 5 = Purple

☐ 1 COLOR OF KEEL: 1 = White; 2 = Cream; 3 = Pink; 4 = Blue; 5 = Purple

☐ 1 COLOR OF WINGS: 1 = White; 2 = Cream; 3 = Pink; 4 = Blue; 5 = Purple

☐ 4 ☐ 5 Days to 50% bloom **200300283**

6. POD MORPHOLOGY (Green pod morphology optional)

Green Mature

☐ ☐ 1 COLOR PATTERN: 1 = Solid; 2 = Striped; 3 = Blotched; 4 = Mottled; 5 = Other _____

☐ ☐ 4 PRIMARY COLOR: 1 = Purple; 2 = Red; 3 = Green; 4 = Yellow; 5 = Tan; 6 = Brown; 7 = Other _____

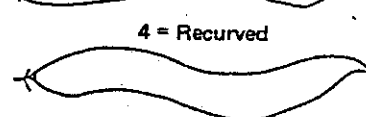
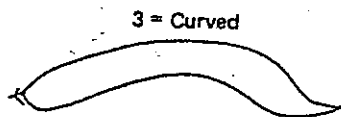
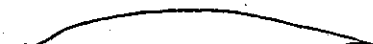
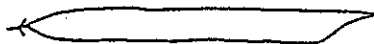
☐ ☐ 1 COLOR MODIFIER: 1 = Light; 2 = Light Medium; 3 = Medium; 4 = Medium Dark; 5 = Dark

☐ ☐ 4 SECONDARY COLOR: 1 = Purple; 2 = Red; 3 = Green; 4 = Yellow; 5 = Tan; 6 = Brown; 7 = Other _____

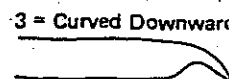
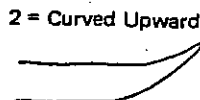
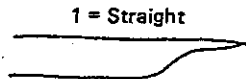
☐ ☐ 1 CROSS SECTION SHAPE: 1 = Flat 2 = Pear 3 = Round 4 = Figure Eight



☐ ☐ 1 POD CURVATURE: 1 = Straight 2 = Slightly Curved 3 = Curved 4 = Recurved



☐ ☐ 1 POD BEAK ORIENTATION: 1 = Straight 2 = Curved Upward 3 = Curved Downward 4 = Variable Average beak length, in cm. _____



☐ ☐ 1 CONSTRICTIONS: 1 = None; 2 = Slight; 3 = Deep

☐ 5 ☐ 7 Average number of seeds per pod

7. SEED COLOR

☐ 1 1 = Shiny; 2 = Dull; 3 = Semishiny; 4 = Variable

☐ 1 1 = Monochrome; 2 = Polychrome

☐ 0 ☐ 1 PRIMARY COLOR: 1 = White; 2 = Yellow; 3 = Buff; 4 = Tan; 5 = Brown; 6 = Pink; 7 = Red; 8 = Purple; 9 = Blue; 10 = Black; 11 = Other _____

☐ ☐ SECONDARY COLOR: 1 = White; 2 = Yellow; 3 = Buff; 4 = Tan; 5 = Brown; 6 = Pink; 7 = Red; 8 = Purple; 9 = Blue; 10 = Black; 11 = Other _____

☐ 1 COLOR PATTERN: 1 = Solid; 2 = Splashed; 3 = Mottled; 4 = Striped; 5 = Flecked; 6 = Dotted

☐ 1 HILAR RING: 1 = Absent; 2 = Present

☐ ☐ HILAR RING COLOR: 1 = White; 2 = Yellow; 3 = Buff; 4 = Tan; 5 = Brown; 6 = Pink; 7 = Red; 8 = Purple; 9 = Blue; 10 = Black; 11 = Other _____

8. SEED SHAPE AND WEIGHT

☐ 1 SHAPE OF SEED TAKEN FROM MIDDLE OF POD: 1 = Round 2 = Oval 3 = Cuboid 4 = Kidney 5 = Truncate Fastigiate



☐ 2 ☐ 5 Dry seed weight in g/100g seeds (adjusted to 12% moisture)

9. ANTHOCYANIN PIGMENTATION

1 = ABSENT
2 = PRESENT

☒ Flowers

☒ Stems

☒ Pods

☒ Seeds

200300283

☒ Leaves

☒ Petioles

☒ Peduncles

☒ Nodes

10. KNOWN DISEASE REACTION

DISEASES - COMMON NAME: Anthracnose, Rust, Powdery mildew, Fusarium root rot, Pythium root rot, Rhizoctonia root rot, Pythium wilt, Sclerotinia white mold, Angular leaf spot, Bacterial wilt, Halo blight, Fusarium blight, Common bacterial blight, Red node virus, Potato mottle virus, Bean common mosaic virus, Bean yellow mosaic virus, Curly top virus, Bacterial brown spot, Bean southern mosaic virus, Other (specify) _____

REACTION: 1 = Susceptible; 2 = Resistant; 3 = Tolerant; 4 = Avoidance

(Give the common name (CN), scientific name (SN), and race(s), where applicable)

☒ DISEASE: CN Anthrachnose; SN Collectotrichum lindemuthianum; Race(s) Race 7, 65,

☒ DISEASE: CN Bean Common Mosiac Virus; SN BCMN, BCMNV; Race(s) All strains

☒ DISEASE: CN Common Bacterial Blight; SN Xanthamonas campestris; Race(s) Michigan isolates

☒ DISEASE: CN Rust; SN Uromyces appendiculatus; Race(s) Race 53

☒ DISEASE: CN White Mold; SN Sclerotinia sclerotiorum; Race(s) Michigan isolate

☐ DISEASE: CN _____; SN _____; Race(s) _____

11. KNOWN INSECT/NEMATODE RESISTANCE

PESTS - COMMON NAME: Aphids, Bean pod weevil, Bruchid beetle, Corn earworm, Flea beetle, Leaf hopper, Lesion nematode, Lygus, Mexican bean beetle, Root knot nematode, Corn seed maggot, Spider mites, Thrips, Weevils, Western bean cutworm, Other (specify) _____

REACTION: 1 = Susceptible; 2 = Resistant; 3 = Tolerant; 4 = Avoidance

(Give the common name (CN), scientific name (SN), and biotype, where applicable)

☒ PEST: CN Potato leafhopper; SN Empoasca fabae; Biotype Michigan isolates

☐ PEST: CN _____; SN _____; Biotype _____

☐ PEST: CN _____; SN _____; Biotype _____

12. KNOWN PHYSIOLOGICAL STRESS REACTION

1 = Susceptible; 2 = Resistant;
3 = Tolerant; 4 = Avoidance

☐ Heat

☐ Cold

☐ Drought

☐ Air Pollution

Nutrient toxicity or deficiency (specify nutrient) _____

Other _____

13. COMMENTS

Seahawk exhibits increased level of tolerance to white mold. Disease Severity Index (DSI) for Seahawk = 33%, versus 48% for Vista

Seahawk
Accepted -----

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EXHIBIT D- ADDITIONAL DESCRIPTION

Registration of 'Seahawk' Navy Bean

'Seahawk' navy bean (*Phaseolus vulgaris* L.) (Reg. no. CV----, PI -----) was developed and released cooperatively by the Michigan Agricultural Experiment Station and the USDA-ARS in 2003 as a high-yielding, midseason, cultivar possessing tolerance to white mold [*Sclerotinia sclerotiorum* (Lib.) de Bary], and excellent canning quality.

Seahawk, tested as N97774, was derived from a cross made in 1994 between navy bean cultivars 'Bunsi' (Tu and Beversdorf, 1982) and 'Huron' (Kelly et al., 1994). Bunsi, also known as 'Ex-Rico 23' in Canada, is a white mold tolerant, mid-season, commercial navy bean cultivar with a semi prostrate indeterminate growth habit that exhibits a persistent green stem at maturity. Huron is a white mold tolerant, early-season, short erect indeterminate commercial navy bean cultivar with excellent canning quality. The cross was made to combine diverse sources of resistance to white mold in navy bean (Kolkman and Kelly, 2002). The F₁ plants were advanced in the greenhouse and space-planted in an F₂ nursery at the Saginaw Valley Bean and Sugarbeet Research Farm near Saginaw, MI. A single-plant F₂ selection was identified as possessing the desired agronomic and navy seed traits. The F₃ progeny row was planted at the University of Puerto Rico Research Station at Isabela and mass selected based on agronomic and seed traits. A single-plant selection was made in a space-planted F_{4:5} nursery in Michigan based on agronomic and navy bean seed traits. The F₅ progeny row was advanced at Isabela PR and the reaction to virus was confirmed by inoculating remnant seed with Bean Common Mosaic Necrosis Virus (BCMNV, strain NL 3). The F_{4:6} breeding line, coded N97774, entered replicated yield trials in 1997.

Seahawk was tested extensively for yield and agronomic traits at 31 locations in Michigan over six seasons (1997B2002). Seahawk averaged 3,100 kg ha⁻¹ and was equivalent in yield to navy bean cultivars >Vista= and 'Schooner' and 'Crestwood' over a number of common test sites ranging from 12 to 23 locations. Seahawk outyielded the commercial navy bean cultivars ('Mayflower=', 'Mackinac', 'Avanti' and 'Navigator') by a margin ranging from 5 to 11% over a number of common locations ranging from 9 to 18. Seahawk demonstrated similar yield superiority among navy bean cultivars entered in the National Cooperative Nurseries grown at 8 locations in North America in 2002.

Seahawk averages 46 cm in height and exhibits a Type IIb indeterminate growth habit, with moderate tolerance to lodging. Seahawk has white flowers and blooms 45 d after planting. Seahawk is a midseason bean, maturing 97 d after planting and has a range in maturity from 90 to 101d, depending on season and location. Seahawk matures similar to Schooner, 3 d earlier than Vista and Mayflower (Kelly et al., 1989). Plants of Seahawk mature uniformly and show excellent dry-down across a broad range of environments.

Seahawk carries the single dominant hypersensitive *I* gene for resistance to bean common mosaic virus (BCMV), but is sensitive to the temperature-insensitive necrosis-inducing strains of BCMNV such as NL 3 and NL 8. Seahawk carries the *Co-2* gene, which conditions resistance to Races 7 and 65 of bean anthracnose [*Colletotrichum lindemuthianum* (Sacc. & Magnus) Lams. - Scrib.]. Seahawk is susceptible to common bacterial blight [*Xanthomonas axonopodis* pv. *phaseoli* (Smith) Dye] and is susceptible to bean rust [*Uromyces appendiculatus* (Pers.:Pers.) Unger] races 38, 39, 40, 41, 43, and 53 that occur occasionally in Michigan. Seahawk is tolerant to white mold and has demonstrated the highest level of tolerance to white mold among commercial navy bean cultivars grown in Michigan. In four years of comparative field-testing, Seahawk exhibited significantly more tolerance (Disease Incidence = 33%) to white mold than Vista (Disease Incidence = 48%).

Seahawk has a large white navy bean seed, which averages 24.6 g 100 seed¹¹ (range: 23 - 27g 100 seed¹¹). The seed is slightly larger in size and lighter in color than other navy bean cultivars. In canning trials, Seahawk was subjectively rated by a team of panelists as having acceptable canning quality for navy beans. In 12 trials, Seahawk scored 3.8 on a seven-point hedonic scale (where 7 is most desirable, 1 is least desirable, and 4 is neither desirable or undesirable), and was equivalent to Schooner but had significantly better canning quality than Vista and Mayflower, which scored 3.1 and 2.8, respectively. The canning quality evaluation is based on whole-bean integrity (no splitting or clumping), uniformity of size (uniform water uptake), color (color retention), and brine free from starch extrusion into the canning liquid. After it is processed, Seahawk does not differ significantly from other commercial navy bean cultivars for hydration, and drained weight ratios, but exhibits a firmer texture than Vista and a lighter cooked color as determined on the L- scale of a Hunter Color Difference Meter.

Seahawk navy bean has been released as a public nonexclusive variety, with the option that Seahawk may be sold for seed by name only under the certified class. A research fee will be assessed on each hundredweight unit of foundation seed sold. Breeder seed is maintained by the Michigan Agricultural Experiment Station, East Lansing, MI 48824, in cooperation with the Michigan Crop Improvement Association.

J. D. KELLY*, G. L. HOSFIELD, G. V. VARNER, M. A. UEBERSAX, M. ENDER
AND J. TAYLOR (1)

References and Notes

- Tu, J.C., and W. D. Beversdorf. 1982. Tolerance to white mold (*Sclerotinia sclerotiorum* (Lib.) De Bary) in Ex Rico 23, a cultivar of white bean (*Phaseolus vulgaris* L.). Can. J. Plant Sci. 62:65-69.

200800283

Seahawk
Accepted -----

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- Kelly, J.D., M.W. Adams, A.W. Saettler, G.L. Hosfield, G.V. Varner, J.S. Beaver, and M.A. Uebersax. 1989. Registration of 'Mayflower' navy bean. Crop Sci. 29:1571.
- Kolkman, J.M., and J.D. Kelly. 2002. Agronomic traits affecting resistance to white mold in common bean. Crop Sci. 42:693-699.
1. J. D. Kelly, M. Ender, and J. Taylor, Dep. of Crop and Soil Sciences, and M.A. Uebersax, Dep. of Food Science and Human Nutrition, Michigan State Univ., East Lansing, MI 48824; M. Ender is sponsored by CAPES-Brazil; G.L. Hosfield, Sugarbeet and Bean Res., USDA-ARS, East Lansing, MI 48824; and G.V. Varner, Mich. Dry Bean Production Res. Advisory Board, 3066 S. Thomas Rd., Saginaw, MI 48603. Research supported by Michigan Foundation Seed Assoc., Michigan Dry Bean Prod. Res. Adv. Board, Michigan Agric. Exp. Stn., and the USDA-ARS. Joint contribution of the Michigan Agric. Exp. Stn. and USDA-ARS. Registration by CSSA. Accepted ----- *Corresponding author (kellyj@msu.edu). Published in Crop Sci. 43:2307-2308, (2003).

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE**EXHIBIT E**
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). The information is held confidential until the certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) Michigan State University	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER N97774	3. VARIETY NAME Seahawk
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country) Michigan State University Office of Intellectual Property 246 Administration Bldg. East Lansing, MI 48824	5. TELEPHONE (Include area code) (517) 355-2186	6. FAX (Include area code) (517) 432-3880
7. PVPO NUMBER 200300283		

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. If no, please explain.



YES



NO

The United States Department of Agriculture -ARS collaborated with Michigan State University (MSU) in the release of Seahawk

9. Is the applicant (individual or company) a U.S. national or a U.S. based company? If no, give name of country.



YES



NO

10. Is the applicant the original owner?



YES



NO

If no, please answer one of the following:

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?



YES



NO

If no, give name of country

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?



YES



NO

If no, give name of country

11. Additional explanation on ownership (Trace ownership from original breeder to current owner. Use the reverse for extra space if needed):

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 0.1 hour per response, including the time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, D.C. 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.